PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : A23L 3/16, 3/18, 1/24

A1

(11) International Publication Number: WO 92/1520

(43) International Publication Date: 17 September 1992 (17.09.92

(21) International Application Number: PCT/US92/01772

(22) International Filing Date: 3 March 1992 (03.03.92)

(30) Priority data:
665,535 4 March 1991 (04.03.91) US
834,125 11 February 1992 (11.02.92) US

(60) Parent Application or Grant
(63) Related by Continuation
US 834,125 (CIP)
Filed on 11 February 1992 (11.02.92)

(71) Applicant *(for all designated States except US):* CURTICE-BURNS, INC. [US/US]; One Lincoln First Square, Rochester, NY 14602 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only) :* MEYER, Richard, S. [US/US]; 125 South 340th, Apt. H, Federal Way, WA 98003 (US). SMITH, Laurie, A. [US/US]; 6718 Rosemount Drive Northwest, Gig Harbor, WA 98335 (US).

(74) Agent: KELBON, Marcia, S.; Christensen, O'Connor Johnson & Kindness, 2800 Pacific First Centre, 142 Fifth Avenue, Seattle, WA 98101 (US).

(81) Designated States: AT, AT (European patent), AU, BB, BI (European patent), BF (OAPI patent), BG, BJ (OAP patent), BR, CA, CF (OAPI patent), CG (OAPI patent) CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE, DE (European patent), DK DK (European patent), ES, ES (European patent), FI FR (European patent), GA (OAPI patent), GB, GB (Eu ropean patent), GN (OAPI patent), GR (European pa tent), HU, IT (European patent), JP, KP, KR, LK, LU LU (European patent), MC (European patent), MG, MI (OAPI patent), MN, MR (OAPI patent), MW, NL, NI (European patent), NO, PL, RO, RU, SD, SE, SE (Euro pean patent), SN (OAPI patent), TD (OAPI patent), TC (OAPI patent), US.

Published
With international search report.

(54) Title: PRESSURE-PROCESSED FOODS

(57) Abstract

A process for hot filling a container with a foodstuff that involves the steps of providing a foodstuff having a pH of from about 4.0 to about 4.5, heating the foodstuff to a temperature of at least about 212 °F whereby the foodstuff is not scorched, chilling the foodstuff to a temperature of not less than 165 °F to about 210 °F, adding the foodstuff to a container and sealing the container, is disclosed. The process of the present invention produces foodstuffs that are storage stable without aseptic processing. The process of the present invention is especially suitable for use in packaging salad dressings and the like in glass containers.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CS	Czechoslovakia
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
LI	Liechtenstein
LK	Sri Lanka
LU	Luxembourg
MC	Monaco
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
NL	Netherlands
NO	Norway
PL	Poland
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SN	Senegal
SU	Soviet Union
TD	Chad
TG	Togo
US	United States of America

PRESSURE-PROCESSED FOODS

Cross-Reference to Related Application

This is a continuation-in-part of prior copending application Serial No. 07/665,535, filed March 4, 1991. The benefit of the filing date of which is hereby claimed under 35 U.S.C. § 120.

Field of the Invention

This invention relates to processing of food products under nonaseptic conditions.

Background of the Invention

In the past, food products, such as salad dressings and the like, have been processed for packaging under various conditions, depending upon the pH of the food product. If the food product has a pH of greater than 4.5 (e.g., 4.6-9.5), aseptic processing has generally been required in order to prevent an unsatisfactory level of pathogenic organisms.

Aseptic food products are produced by heating the food product in a sterile environment to a predetermined temperature for a length of time sufficient to eliminate pathogens; that is, microorganisms that can cause spoilage of the food product. The food product must then be transferred to and stored, for example, in a sterile container or package to prevent the reentry of microorganisms over time. Conventional aseptic processing systems typically involve a continuous sterile flow path, including holding tanks, pumps, heat exchangers for both heating and cooling and packaging machinery. An improved aseptic processing technique for food products is disclosed in U.S. Patent No. 4,929,463. That process, which was particularly useful in conjunction with food products containing particulate components, involves heating the particulate and nonparticulate components of the food separately at a temperature and time sufficient for sterilization of each component. After sterilization, the components are then recombined and packaged.

For foodstuffs having a pH of less than about 4.0, aseptic processing has not been employed in the past since the danger of microorganism growth is lessened. These acidic foodstuffs can be cold filled into a container with relatively little danger. Presently, most commercial salad dressings are cold processed in this manner. Accordingly, most such salad dressings have a pH of less than about 4.0 and, thus, are quite acidic. The acidic nature of these salad dressings, and other foods, can detract from the desired flavor characteristics thereof.

Table 1 (below) depicts various food processing procedures as a function of pH and pressure.

Table 1

pH Pressure	<pH 4.0	pH 4.0-4.5	>pH 4.5
Low Pressure	Cold fill (e.g., salad dressings)	Hot fill (180°-200°F) (e.g., catsup, apple juice)	irradiation
High Pressure	Cold fill (e.g., soda pop)	Present Invention Hot or cold fill (e.g., salad dressings, etc.)	Retort processed (250°F) Aseptic processed (280°F) (e.g., canned goods, cheese sauces, puddings)

In spite of the above-described processing techniques, there has remained a need for new and improved processes for packaging foodstuffs. In particular, it would be desirable to package a salad dressing or other foodstuff which is less acidic than pH 4.0 under nonaseptic conditions, thereby simplifying the process and making it more economical, and also resulting in a foodstuff without the poor taste characteristics associated with highly acidic foods.

Summary of the Invention

Accordingly, the present invention provides a process for treating food products having a pH of greater than 4.0 under nonaseptic conditions. The inventors discovered that over a pH range of about 4.0 to 4.5, foodstuffs can be safely packaged under nonaseptic conditions if they are subjected to a process including the steps of: heating the foodstuff at a temperature of at least about 212°F, under pressure, for a time period of about four minutes to about less

than one second, and such that the foodstuff is not scorched, followed by chilling the foodstuff to a temperature of from about 60°F to about 210°F, and then adding the foodstuff to a container followed by sealing the container, whereby at least about 99% of the vegetative cells in the final product are killed. Surprisingly, under these conditions, the lack of aseptic conditions does not pose a danger in terms of the content of pathogenic organisms or other spoilage-causing organisms. As a result of this processing technique, the resulting packaged foods have a more mellow flavor, due to less acid content. For example, salad dressings processed in this manner possess a refrigerated fresh flavor while retaining shelf stability. The time necessary to pasteurize products at temperatures less than 210°F results in a scorched, cooked flavor.

Brief Description of the Drawing

The details of a typical embodiment of the present invention will be described in connection with the accompanying FIGURE, which is a schematic illustration of the sequence of steps involved in the processing techniques for foodstuffs in accordance with the present invention.

Detailed Description of the Invention

The present invention provides new processes for packaging foodstuffs, which processes are nonaseptic and which foodstuffs have a pH of from 4.0 to 4.5.

The foodstuffs that may be subjected to the processing methods of the present invention are typically liquids, semi-solids, or liquids (or a viscous matrix) containing solid components. For example, the following exemplary foodstuffs may be subjected to the present processing methods: sauces (e.g., spaghetti sauce, salsa, ketchup, alfredo sauce), condiments, salad dressings, dips (e.g., French onion), reduced calorie syrups, ice cream toppings, pie fillings, chili, macaroni and cheese (e.g., sour cream and cheddar cheese flavored), beef stroganoff, lemon butter-flavored fish, whipped dessert toppings (e.g., Cool Whip), jams and jellies, canned fruits (e.g., melons, pineapple, and cantaloupe), fruit or vegetable juices, shelf-stable yogurt, tomato-based soups, creamy sour cream/yogurt soups, pickled seafood (e.g., fish or shrimp), and the like. A particularly preferred foodstuff for use in connection with the present invention is selected from among various salad dressings, including salad dressings that contain particulate components such as blue cheese dressing, and the like.

The pH of the foodstuffs may be measured by any standard method. In some instances, such as with foodstuffs that are very viscous or those having significant amounts of solid components, the pH may need to be measured by

dissolving or suspending a sample of the foodstuff in aqueous solution or otherwise processing the foodstuff to enable or facilitate a representative pH measurement. In cases where the foodstuff does not possess a homogeneous pH profile, it is acceptable for purposes of this invention if the bulk of the foodstuff has the requisite pH while a minor portion (e.g., up to about 5-10% by weight) has a different pH. In such cases, it is still preferred that the pH of the foodstuff be capable of equilibrating to reach the pH range of 4.0 to 4.5 within 24 hours.

An optional first step of the process of the present invention involves adjusting the pH of the foodstuff to a pH of between 4.0 and 4.5, if the initial pH (or initial average pH) of the foodstuff is outside of this range. Some foods may already fall in this pH range and, thus, it will not be necessary to adjust their pH. For those that must be acidified (i.e., the starting pH is greater than 4.5), a standard food-compatible acid may be added in an amount sufficient to lower the pH to between 4.0 and 4.5. Acids such as acetic acid, ascorbic acid, glucodeltalactone, lactic acid, citric acid, or phosphoric acid, and the like could be used for this purpose. When it is necessary to render the foodstuff more basic (i.e., the starting pH is less than 4.0), a food-compatible base may be added. Bases such as sodium hydroxide, sodium bicarbonate, potassium hydroxide or calcium hydroxide, and the like may be added for this purpose.

After adjustment of the pH of the foodstuff to fall within the pH range of 4.0 and 4.5, if necessary, the next step of the present process is to raise the temperature of the foodstuff to at least about 212°F in a closed container. The temperature, time (see below), and other parameters should be chosen so as to not scorch the foodstuff. While the upper temperature of this step is not necessarily limited except by the need to avoid scorching, an upper limit of about 300°F will suffice for most situations. Preferably, the temperature will be raised to about 220°F to 270°F.

The time period during which the temperature is maintained at this elevated level will typically range from about four minutes to less than one second. As noted above, the time and temperature combination should be chosen so that the food does not significantly scorch (i.e., turn dark in color and/or develop an unacceptable burned flavor). The combination of time and temperature to be utilized for a particular foodstuff can be readily ascertained by routine experimentation.

For a typical foodstuff, the following pH, temperature, and time combinations can be suitably employed:

	pH = 4.0 Temperature/Time	pH - 4.5 Temperature Time
1.	212°F/10 sec.	212°F/3.5 min.
2.	220°F/3 sec.	220°F/1.1 min.
3.	270°F/< 1 sec.	270°F/< 1 sec.

The most preferred combinations are: for pH 4.0, 220°F/3 seconds, and for pH 4.5, 220°F/1.1 minutes.

During this heating step, since the container holding the foodstuff is closed, the foodstuff will be exposed to increased pressure. Over a temperature range of 210°F and 300°F, the pressure (in lb. per sq. in.) will preferably range from 0.01 to 70, preferably 3 to 67 lb./sq. inch.

The next step of the present process is to chill the heated foodstuff to a temperature of from about 60°F to 210°F depending upon the pH, and time, and various standard factors. More preferably, the heated foodstuff is chilled to a temperature of from not less than 165°F to 210°F, and most preferably, from not less than 180°F to 210°F. The chilling may be carried out by cooling with a cooler liquid (e.g., water), with a cooler gas (e.g., air), with a cooler solid (e.g., ice), or any other cooling technique. A heat exchanger is generally used for this step. The cooling should occur immediately after the heating step (e.g., within about 5 seconds), and should be accomplished in a short period (over a time period within about 10 seconds). It is preferred that the chilling be down to a temperature of 180°F to 200°F, especially for foods having a relatively high pH (e.g., 4.3-4.5).

In summary, the heating and chilling steps are carried out within the following parameters:

Heating Step:

pH = 4.0-4.5
temperature = 212-300°F
time = < 1-240 sec.
pressure = 0.01 to 70 lb./sq. in.

Chilling Step:

pH = 4.0-4.5
temperature = 60-210°F, preferably not less than 165-210°F
time = less than/equal to 10 sec.
pressure = determined by other conditions

The particular conditions selected should also be such that at least about 99% of the vegetative cells (e.g., microorganisms) have been rendered non-viable in the final product. Testing foodstuffs for their viable vegetative cell content is a relatively routine matter. For example, a standard agar plate count method could be employed, enabling a comparison of vegetative cell count both before and after the foodstuff has been processed by the methods disclosed herein. It will be recognized by one of ordinary skill that as the pH increases from 4.0 to 4.5, the temperatures in both the heating and chilling steps will usually be required to be higher and the time period for the heating step longer to result in the requisite degree of vegetative cell elimination.

Thus, the foodstuff has been heated in accordance with the above time and temperature schedule to pasteurize the foodstuff. However, practice of the present inventive process does not require that the foodstuff be made commercially sterile -- i.e., not all pathogenic spores need be killed. Preferably, the present invention involves heating under at least pasteurization, but non-commercially sterile conditions, so as to avoid scorching. It is preferred that the heating step be carried out at temperatures of from 220° to 270°F.

After the chilling step, the foodstuff is added to a container (i.e., a hot fill step). Simple pouring into the container will suffice for most purposes. Preferably, the present process involves heating the foodstuff, in accordance with the above-noted time and temperature schedule, followed by immediately chilling the foodstuff, followed by immediate introduction to the container, without interruption. The total time elapsed from the start of heating until the introduction to the containers in accordance with the present inventive process is less than 20 minutes, and preferably less than 10 minutes, and most preferably, less than 5 minutes, so as to increase production line speeds.

For foods having a pH approaching 4.5, it is preferred that the foodstuff be added into the container and the container sealed prior to a lowering of the temperature of the foodstuff below about 185°F. If the temperature drops below 185°F, the danger of contamination with viable pathogenic organisms increases.

It is also preferred that after the container is sealed with the foodstuff inside, the container is rotated, inverted or otherwise moved so that the foodstuff comes into contact with all interior surfaces of the container (including the interior surface of a cap, if sealing occurs with a cap). Contacting the foodstuff with these interior

surfaces should be carried out while the foodstuff is still at an elevated temperature (e.g., at or above about 185°F, when the pH is at or above about 4.3) to insure proper pasteurization of the internal surface of the package.

The container into which the foodstuff is placed will typically be one that has not been treated to be aseptic, thus reducing the costs and complexity of steps associated with aseptic container preparation and filling under aseptic conditions. Typically, standard nonaseptic metal, glass, plastic or composite (e.g., foil and fiberboard) containers may be used.

The container is next hermetically sealed by any standard method of sealing.

The foodstuffs processed in the above-described manner will typically contain less acid and, therefore, exhibit a milder flavor than traditional foodstuffs, which are generally packaged at a pH of less than 4.0. For example, salad dressings prepared by the above processes taste like a refrigerated product, but will be shelf stable. The process is further advantageous as compared to aseptic processes in that it is less expensive, simpler, and faster.

In addition to primarily liquid foodstuffs, foodstuffs containing solid or particulate components may also be employed. For example, chunky products (e.g., beef stroganoff, macaroni and cheese, blue cheese dressing, etc.) may be subjected to the hot fill processing method described above.

It is also possible to couple the above-described method with certain features of the method described in U.S. Patent No. 4,929,463. For example, the solid or particulate component of the foodstuff may be separated from the viscous matrix (e.g., a liquid component) and independently treated, followed by recombination prior to packaging. U.S. Patent No. 4,929,463 is hereby incorporated by reference in its entirety herein.

Referring now to the FIGURE, the basic steps of the present invention are exemplified.

A foodstuff having the appropriate pH, which is to be processed, is placed in a cooking kettle (2) and after cooking for the desired period of time, it is passed to a mixer (4). The foodstuff is next passed to a homogenizer/colloid mill (6). If the foodstuff contains particulates, they are sent from a particulate container (8), and mixed in a mixer (10) with the remaining foodstuff material. The foodstuff is then sent to a container (12) for heating; this is the heating step of the process of the invention. Thereafter, the foodstuff is chilled in a heat exchanger (14) and then added to an appropriate container by a filler (16). The container which now holds the foodstuff is sealed (e.g., capped) by a capper (18) and then the container is

rotated/inverted so that the foodstuff contacts all interior surfaces for pasteurization thereof. The container is sent to a cooling chamber (22), a dryer (24), a labeller (26), and a caser (28) for final packaging.

In addition to the foodstuff, it is also possible to include a preservative in the foodstuff to retard the onset of mold growth or proliferation of other organisms after the bottle is opened. Other additives standard in the food industry may also be packaged in the container as desired or necessary.

The process of the present invention is further illustrated by the following examples, which are presented to illustrate the present invention and to assist one of ordinary skill in the art in making and using the same. The invention is not intended in any way to either limit the scope of the disclosure or the protection afforded by the grant of Letters Patent hereon.

Example 1

Ranch Dressing Formula:

Water	34.0% (by weight)
Soybean Oil	30.0
Fresh Nonfat Buttermilk	28.0
Distilled Vinegar, 120 grain	2.0
Salt	1.9
Avicel RC-581	1.0
Monosodium Glutamate	0.8
Santone 8-1-0	0.5
Kelcoloid LVF	0.5
Keltrol T	0.4
Spices	0.9
	100.0

Process:

The Santone was mixed in a small amount of hot water until dissolved. The remaining water (cold) and the Avicel were added and mixed for 10 minutes. Buttermilk was added and mix was heated to 185°F to denature the milk protein. Gums were dispersed in the oil and the remaining ingredients except parsley were mixed together. Product was homogenized twice at 500/5000 psi. Yield was measured and parsley was added. Product was then processed at 220°F for

approximately 1-1/2 minutes at 3 psi. Product exited the system at 180°F. The pH of finished product: 4.4.

The flavor of the finished product closely replicated Ranch dressing made with fresh buttermilk, mayonnaise and packaged spice mix.

Modifications in the recipe can be made to alter viscosity, flavor and color.

Example 2

Blue Cheese Dressing Formula:

Water, Cold	25.0700
Water, Hot	6.0000
Soybean Oil	25.0000
Buttermilk, Fresh	25.0000
Avicel	1.5000
Kelcoloid LV	0.2500
Vinegar, 120 Grain	2.0000
Keltrol	0.4000
Salt	1.4000
Blue Cheese Flavor	0.2000
Spices	0.2300
Santone 8-1-0	0.4000
Flavors	0.5500
Blue Cheese Crumbles	12.0000
	100.0000

Process:

The process was essentially the same as in Example 1.

As will be apparent to those skilled in the art, the present invention may be embodied in forms other than those specifically disclosed above without departing from the spirit or essential characteristics of the invention. Particular embodiments of the present invention described above are therefore to be considered in all respects as illustrative and not restrictive. The scope of the Letters Patent granted hereon is to be limited only by the definitions set forth in the appended claims and equivalents thereof.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of processing a foodstuff, comprising:

(a) providing a foodstuff having a pH of from about 4.0 to about 4.5;

(b) heating said foodstuff to a temperature of at least about 212°F under pressure for a time period of about four minutes to less than one second, such that said foodstuff is not scorched;

(c) chilling said foodstuff to a temperature of from not less than 165°F to about 210°F;

(d) adding said foodstuff while at a temperature of from not less than 165°F to about 210°F to a container; and

(e) hermetically sealing said container, wherein said method results in a processed foodstuff in which about 99% or more of vegetative cells in said foodstuff are killed.

2. A method according to Claim 1, wherein said foodstuff is selected from the group consisting of sauces, condiments, salad dressings, dips, syrups, ice cream toppings, pie fillings, reduced calorie mayonnaise, macaroni and cheese, beef stroganoff, chili, whipped desserts, canned fruits, fruit and vegetable juices, yogurt, tomato-based soups, sour cream-based soups, yogurt-based soups, and pickled seafoods.

3. A method according to Claim 2, wherein said sauce is salsa, ketchup or spaghetti sauce.

4. A method according to Claim 2, wherein said syrup is a reduced calorie syrup.

5. A method according to Claim 1, wherein at least one preservative is added to said container prior to sealing.

6. A method according to Claim 1, wherein said foodstuff comprises a particulate component in a viscous matrix.

7. A method according to Claim 6, wherein said foodstuff is blue cheese dressing or yogurt dressing.

8. A method according to Claim 1, wherein said heating step comprises heating said foodstuff to a temperature of from about 212°F to 300°F.

9. A method according to Claim 1, wherein said chilling step reduces the temperature of the foodstuff to about 185° to 210°F and said method further comprises, after said sealing step, causing said foodstuff to contact the interior surfaces of said container while said foodstuff is still at a temperature of about 185° to 210°F.

10. A method according to Claim 1, wherein said heating step entails heating said foodstuff to a temperature and for a time period at least sufficient to pasteurize said foodstuff, without rendering said foodstuff commercially sterile.

11. A method according to Claim 1, wherein the total time elapsed from the start of the heating step to the addition of said foodstuff to a container is less than 20 minutes.

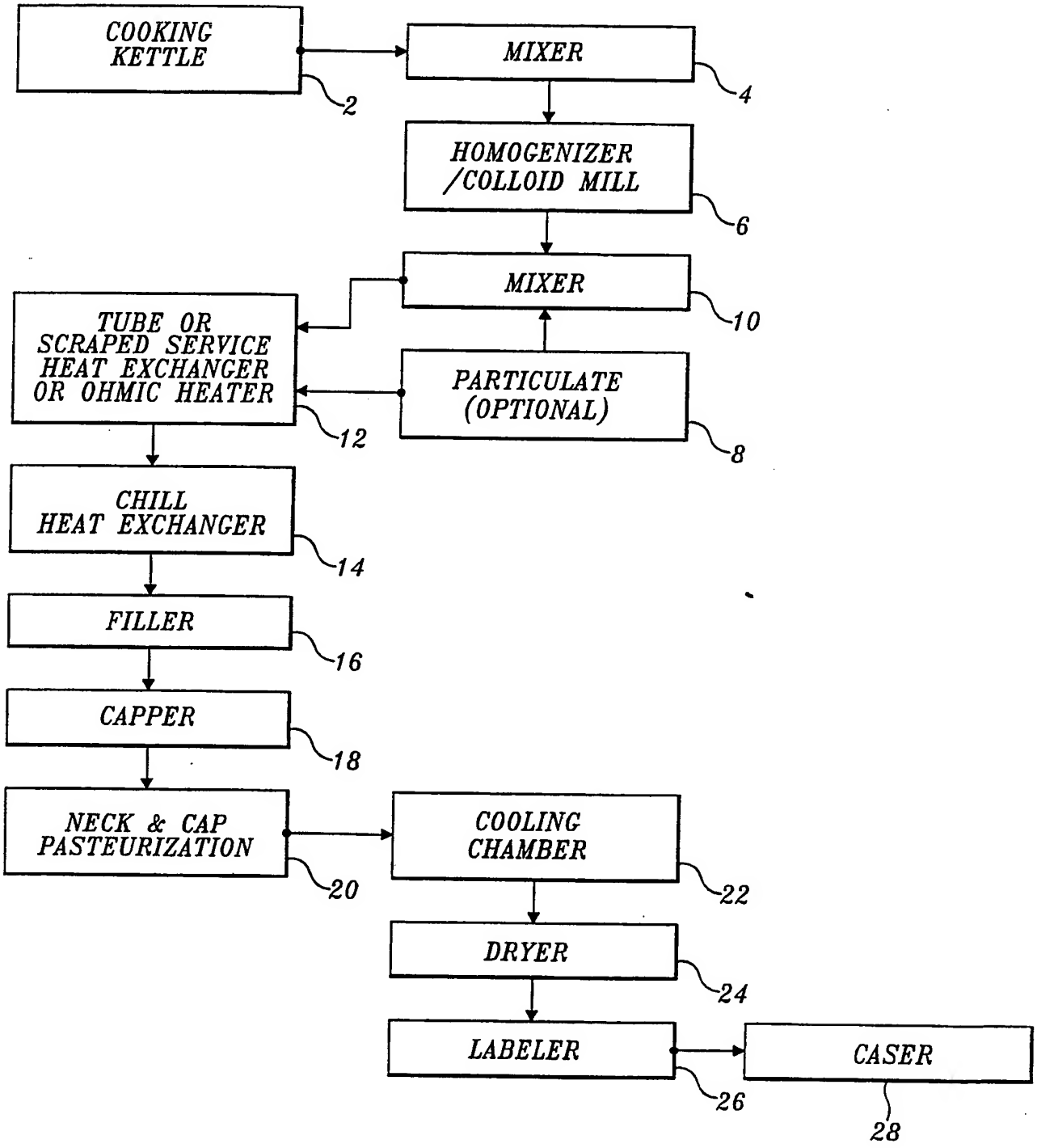
COOKING KETTLE
2
MIXER
4
HOMOGENIZER /COLLOID MILL
6
MIXER
10
TUBE OR SCRAPED SERVICE HEAT EXCHANGER OR OHMIC HEATER
12
PARTICULATE (OPTIONAL)
8
CHILL HEAT EXCHANGER
14
FILLER
16
CAPPER
18
NECK & CAP PASTEURIZATION
20
COOLING CHAMBER
22
DRYER
24
LABELER
26
CASER
28

FIG. 1.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 92/01772

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A23L3/16; A23L3/18; A23L1/24

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A23L ; A23G

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category[10]	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	EP,A,0 128 610 (THE PROCTER & GAMBLE COMPANY) 19 December 1984 see the whole document	1-3,6, 8-11
A	WO,A,8 902 928 (THE NEW COVENT GARDEN SOUP COMPANY LTD) 6 April 1989 see page 2, line 11 - line 13; example see page 4, line 10 - line 24	1,2,10
A	FR,A,1 399 827 (SWIFT & COMPANY) 12 April 1965 see claims 1-3,9-12	1

[10] Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26 MAY 1992	09 JUN 1992
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	LEPRETRE F.G.M.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. US 9201772 SA 58109

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 26/05/92
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0128610	19-12-84	US-A-	4539212	03-09-85
		CA-A-	1216187	06-01-87
WO-A-8902928	06-04-89	GB-A-	2210246	07-06-89
		AU-A-	2521188	18-04-89
		EP-A-	0393052	24-10-90
FR-A-1399827		None		